

## **Remarks**

### **Claim Amendments**

Claim 1 has been amended to limit the concentration range of the adduct of maleic anhydride and polybutadiene to 4.5 to 10 phr. Support is found in the specification as filed at page 13, lines 28 to 30, and at page 20, Table 5.

Claim 17 has been amended to further limit the concentration of the adduct of maleic anhydride and polybutadiene to 6 to 10 phr. Support is found in the specification as filed at page 13, lines 28 to 30, and at page 20, Table 5.

Claims 20 and 21 have added to further define what Applicants regard as the invention. Support is found in the specification as filed at page 13, lines 28 to 30, and at page 20, Table 5.

### **Rejections Under 35 U.S.C. Section 103**

The claims have been rejected under 35 U.S.C. Section 103(a) as being unpatentable over Corvasce et al. (U.S. Patent No. 5,672,639; hereinafter "Corvasce") in view of Huynh-Tran et al. (US2003/0152758, hereinafter "Huynh-Tran"). To the extent the amended claims are deemed unpatentable over the cited art, these rejections are traversed.

Applicants incorporate by reference the arguments regarding the showing of unexpected results previously presented in the Appeal Brief mailed March 27, 2006 and Reply Brief mailed January 25, 2007, and further in the Frank Declaration mailed September 15, 2008, and add the following comments.

It is to be noted that the observed nonlinearity in G" versus strain discussed in the Frank Declaration is significantly more pronounced with the addition of higher amounts of the recited adduct of maleic anhydride and polybutadiene (ie, maleinized polybutadiene). The following Table

A shows values for  $G''$  taken from Figure A of the Frank Declaration.

**Table A** Data from Table A of Frank Declaration.

<u>Sample No.</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>E</u>	<u>F</u>	<u>G</u>
Maleinized Polybutadiene, phr	0	1.5	4.5	9	0	0	0
Unmodified Polybutadiene, phr	0	0	0	0	1.5	4.5	9
$G''$ at 0.7% strain, $N/mm^2/10^5$	153	158	197	294	142	134	112
$G''$ at 24% strain, $N/mm^2/10^5$	142	146	181	243	132	123	105
decrease in $G''$ over strain range	11	12	16	51	10	11	7
% decrease in $G''$ over strain range	7.2	7.6	8.1	17.4	7.0	8.2	6.3

As is seen from the Table A, the 17.4 percent decrease in  $G''$  over the illustrated strain range for Sample D with 9 phr of maleinized polybutadiene is significantly higher than that for the unmodified polybutadiene (Sample G v Sample D). By contrast, for the entire range of unmodified polybutadiene amounts (Samples E, F and G) and for the lower amounts of maleinized polybutadiene (Samples B and C), the nonlinearity in  $G''$  is observed to be similar to control Sample A with a percent decrease in  $G''$  of only about 7 to 8.

While the Examiner is correct that the maleinized polybutadiene compositions all exhibit a nonlinear  $G''$  over the strain range, at the higher concentration of maleinized polybutadiene illustrated by Sample D the nonlinearity is much more pronounced. As noted in the Frank Declaration, paragraph 5, this behavior is consistent with the specification suggestion (page 24, lines 14 through 23) that in the presence of the maleic anhydride/polybutadiene adduct, a core-shell interphase between the polymer matrix and the starch/plasticizer composite filler exists and remains soft at low temperature, and as a consequence can induce higher loss properties than is possible without the maleic anhydride/polybutadiene adduct. The lower stiffness at large strain may be attributed to the softer core shell with the adduct of maleic anhydride and polybutadiene, as compared to the un-modified polybutadiene. This finding is particularly surprising and unexpected

in view of the teaching of Corvasce (U.S. Patent No. 5,672,639), which only teaches the use of the un-modified polybutadiene and does not teach such an effect for maleic anhydride/polybutadiene adduct.

Applicants urge therefore that the claims as amended are commensurate in scope with the showing of unexpected results and are patentable over the cited art. In particular, Applicants urge that the adduct of maleic anhydride and polybutadiene range of 4.5 to 10 phr (claim 1), 6 to 10 phr (claim 17), and 7.5 to 10 phr (claim 20) are commensurate in scope with the showing of unexpected results. While the more pronounced nonlinearity in G" is demonstrated only at 9 phr, Applicants urge that this is sufficient to support the broader claimed ranges as the established trend demonstrates that the nonlinear behavior in G" can be expected at concentrations higher than at least 4.5 phr. "[T]he unobviousness of a broader claimed range can, in certain instances, be proven by a narrower range of data. Often, one having ordinary skill in the art may be able to ascertain a trend in the exemplified data which would allow him to reasonably extend the probative value thereof."

In re Kollman and Irwin, 201 U.S.P.Q. 193, 199 (C.C.P.A. 1979).

Applicants urge that claim 21 is independently patentable and commensurate in scope with the showing of unexpected results. Clearly, the significantly more pronounced nonlinearity in G" at 9 phr for Sample D can be expected to apply to higher concentrations of the adduct of maleic anhydride and polybutadiene, at least up to 10 phr. In re Kollman.

**Conclusion**

Applicants urge that the amended claims are now fully patentable over the cited art.

Applicants respectfully request allowance of all claims.

Respectfully submitted,

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